IN THE CLAIMS

Please substitute the following listing of claims for the previous listing of claims.

1. (Previously presented) A method of etching a silicon-containing material on a substrate, the method comprising:

placing the substrate in a process chamber; and

providing in the process chamber, an energized gas formed by coupling RF or microwave energy to a process gas comprising fluorine-containing etching gas, chlorine-containing etching gas and sidewall-passivation gas, the sidewall-passivation gas being a gas other than the fluorine-containing etching gas, wherein the volumetric flow ratio of the fluorine-containing etching gas to the chlorine-containing etching gas is from about 2:1 to about 8:1.

2. (Previously presented) A method according to claim 1 wherein the silicon-containing material on the substrate comprises regions having different compositions, and wherein the volumetric flow ratio of the fluorine-containing etching gas, chlorine-containing etching gas, and sidewall-passivation gas is selected to etch the regions having different compositions at substantially similar etch rates.

3. (Original) A method according to claim 2 wherein the silicon-containing material comprises polysilicon.

4. (Original) A method according to claim 3 wherein the regions having different compositions comprise dopant in a plurality of concentrations or types.

5. (Original) A method according to claim 2 wherein the substantially similar etch rates are etch rates that vary by less than about 5%.

6. (canceled)

7. (Previously presented) A method according to claim 1 wherein the fluorine-containing etching gas comprises one or more of NF_3, CF_4 or SF_6.

8. (Previously presented) A method according to claim 1 wherein the chlorine-containing etching gas comprises one or more of Cl_2 or HCl.

9. (Original) A method according to claim 1 wherein the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon-monoxide.

10. (currently amended) A method according to claim 9 wherein the volumetric flow ratio of the combined volumetric flow rate of the fluorine-containing etching gas and chlorine-containing etching gas to the volumetric flow rate of the sidewall-passivation gas is from 1:1 to about 10:1.

11. (Previously presented) A method according to claim 1 wherein the process gas is absent HBr, Br_2 or CH_3Br.

12. (Previously presented) A method according to claim 11 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

13. (Previously presented) A method according to claim 12 wherein the second process gas further comprises one or more of Cl_2, $He\text{-}O_2$ and CF_4.

14. (Previously presented) A method of etching a substrate in a process chamber while simultaneously cleaning surfaces in the process chamber, the method comprising:

placing the substrate in the process chamber, the substrate comprising a silicon-containing material having a plurality of dopant concentrations or dopant types; and

providing in the process chamber, an energized process gas formed by coupling RF or microwave energy to a process gas comprising fluorine-containing gas, chlorine-containing gas and sidewall-passivation gas, the volumetric flow ratio of the fluorine-containing gas to the chlorine-containing gas being from about 2:1 to about 8:1, whereby the plurality of dopant concentrations or dopant types in the silicon-containing material are etched at substantially similar rates.

15. (Previously presented) A method according to claim 14 wherein the volumetric flow ratio of the fluorine-containing gas, chlorine-containing gas and sidewall-passivation gas, is selected to etch the plurality of dopant concentrations or dopant types in the silicon-containing material at etch rates that vary by less than about 5%.

16. (Canceled)

17. (Original) A method according to claim 14 comprising at least one of the following characteristics (i) the fluorine-containing gas comprises one or more of NF_3, CF_4 or SF_6; (ii) the chlorine-containing gas comprises one or more of Cl_2 or HCl; or (iii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

18. (Previously presented) A method according to claim 14 wherein the volumetric flow ratio of the combined volumetric flow rate of the fluorine-containing and chlorine-containing etching gas to the volumetric flow rate of the sidewall-passivation gas is from about 1:1 to about 10:1.

19. (Previously presented) A method according to claim 18 wherein the process gas is absent HBr, Br_2 or CH_3Br.

20. (Previously presented) A method according to claim 19 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

21. (Previously presented) A method according to claim 20 wherein the second process gas further comprises one or more of Cl_2, $He\text{-}O_2$ and CF_4.

22-31. (cancelled)

32. (Previously presented) A method of etching a silicon-containing material on a substrate, the method comprising:

placing the substrate in a process chamber;

in a first etching stage, providing in the process chamber, an energized gas formed from a first process gas comprising fluorine-containing etching gas, chlorine-containing etching gas and sidewall-passivation gas, the sidewall-passivation gas being a gas other than the fluorine-containing etching gas, the first process gas being absent HBr, Br_2 or CH_3Br; and

in a second etching stage, providing in the process chamber, an energized gas formed from a second process gas comprising HBr, Br_2 or CH_3Br.

33. (Previously presented) A method according to claim 32 wherein the silicon-containing material on the substrate comprises regions having different compositions, and wherein the first process gas comprises a volumetric flow ratio of fluorine-containing etching gas, chlorine-containing etching gas and sidewall-passivation gas that is selected to etch the regions having different compositions at substantially similar etch rates.

34. (Original) A method according to claim 33 wherein the silicon-containing material comprises polysilicon.

35. (Original) A method according to claim 33 wherein the regions having different compositions comprise dopant in a plurality of concentrations or types.

36. (Original) A method according to claim 33 wherein the substantially similar etch rates are etch rates that vary by less than about 5%.

37. (Previously presented) A method according to claim 32 wherein the first process gas comprises a volumetric flow ratio of fluorine-containing etching gas to chlorine-containing etching gas that is from about 2:1 to about 8:1.

38. (Previously presented) A method according to claim 32 wherein the fluorine-containing etching gas comprises one or more of NF_3, CF_4 or SF_6.

39. (Previously presented) A method according to claim 32 wherein the chlorine-containing etching gas comprises one or more of Cl_2 or HCl.

40. (Original) A method according to claim 32 wherein the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon-monoxide.

41. (currently amended) A method according to claim 32 wherein the volumetric flow ratio of the combined volumetric flow rate of the fluorine-containing etching gas and chlorine-containing etching gas to the volumetric flow rate of the sidewall-passivation gas is from 1:1 to about 10:1.

42. (Previously presented) A method according to claim 32 wherein the second process gas comprises HBr.

43. (Previously presented) A method according to claim 42 wherein the second process gas further comprises one or more of Cl_2, He-O_2 and CF_4.

44. (Previously presented) A method of etching a substrate comprising a silicon-containing material having a plurality of dopant concentrations or dopant types, the method comprising:

placing a substrate comprising a silicon-containing material having a plurality of dopant concentrations or dopant types in a process chamber;

in a first etch step, providing in the process chamber, an energized gas formed from a first process gas comprising fluorine-containing gas, chlorine-containing gas and sidewall-passivation gas, the volumetric flow ratio of the combined volumetric flow rate of the fluorine-containing and chlorine-containing gas to the volumetric flow rate of the sidewall-passivation gas being from about 1:1 to about 10:1, wherein the volumetric flow ratio is selected such that the plurality of dopant concentrations or dopant types in the silicon-containing material are etched at etch rates that vary by less than about 5%; and

in a second etch step, providing in the process chamber, an energized gas formed from a second process gas comprising HBr.

45. (Previously presented) A method according to claim 44 comprising at least one of the following characteristics (i) the fluorine-containing gas comprises one or more of NF_3, CF_4 or SF_6; (ii) the chlorine-containing gas comprises one or more of Cl_2 or HCl; or (iii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

46. (Previously presented) A method according to claim 44 wherein the second process gas further comprises one or more of Cl_2, He-O_2 and CF_4.

47. (Previously presented) A method of etching a substrate comprising a silicon-containing material having a plurality of dopant concentrations or dopant types, the method comprising:

placing a substrate comprising a silicon-containing material having a plurality of dopant concentrations or dopant types in a process chamber;

in a first etching stage, providing in the process chamber, an energized gas formed from a first process gas consisting essentially of a fluorine-containing gas, a chlorine-containing gas and a sidewall-passivation gas in a volumetric flow ratio selected to etch the plurality of dopant concentrations or dopant types at etch rates that vary by less than about 5%; and

in a second etching stage, providing in the process chamber, an energized gas formed from a second process gas comprising HBr, Br_2 or CH_3Br.

48. (Previously presented) A method according to claim 47 comprising at least one of the following characteristics (i) the fluorine-containing gas comprises one or more of NF_3, CF_4 or SF_6; (ii) the chlorine-containing gas comprises one or more of Cl_2 or HCl; or (iii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

49. (Previously presented) A method according to claim 47 wherein the second process gas further comprises one or more of Cl_2, $He\text{-}O_2$ and CF_4.

50. (previously presented) A substrate etching method comprising;

placing a substrate comprising a silicon-containing material in a process chamber, the silicon-containing material comprising at least one of silicon dioxide, silicon nitride, polysilicon and monocrystalline silicon; and

etching the silicon-containing material by providing in the process chamber, an energized gas formed from a process gas comprising CF_4, chlorine-containing gas and sidewall-passivation gas.

51. (Previously presented) A method according to claim 50 wherein the silicon-containing material comprises a plurality of dopant concentrations or dopant types, and wherein the volumetric flow ratio of the CF_4, chlorine-containing gas, and sidewall-passivation gas is selected to etch the plurality of dopant concentrations or dopant types at etch rates that vary by less than about 5%.

52. (currently amended) A method according to claim 50 wherein the volumetric flow ratio of ~~the fluorine-containing gas~~ CF_4 to the chlorine-containing gas is from about 2:1 to about 8:1.

53. (Previously presented) A method according to claim 50 wherein the volumetric flow ratio of the combined volumetric flow rate of the CF_4 and chlorine-containing gas to the volumetric flow rate of the sidewall-passivation gas is from 1:1 to about 10:1.

54. (Previously presented) A method according to claim 50 comprising at least one of the following characteristics (i) the chlorine-containing gas comprises one or more of Cl_2 or HCl; or (ii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

55. (Previously presented) A method according to claim 50 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

56. (previously presented) A substrate etching method comprising:

placing a substrate comprising a silicon-containing material in a process chamber, the silicon-containing material comprising at least one of silicon dioxide, silicon nitride, polysilicon and monocrystalline silicon; and

etching the silicon-containing material by providing in the process chamber, an energized gas formed by coupling RF or microwave energy to a process gas comprising fluorine-containing etching gas, chlorine containing etching gas comprising one or more of Cl_2 and HCl, and sidewall-passivation gas comprising a gas other than the fluorine-containing etching gas.

57. (Previously presented) A method according to claim 56 wherein the silicon-containing material comprises a plurality of dopant concentrations or dopant types, and wherein the volumetric flow ratio of the fluorine-containing etching gas, chlorine-containing etching gas, and sidewall-passivation gas is selected to etch the plurality of dopant concentrations or dopant types at etch rates that vary by less than about 5%.

58. (Previously presented) A method according to claim 56 wherein the volumetric flow ratio of the fluorine-containing etching gas to the chlorine-containing etching gas is from about 2:1 to about 8:1.

59. (currently amended) A method according to claim 56 wherein the volumetric flow ratio of the combined volumetric flow rate of the fluorine-containing etching gas and chlorine-containing etching gas to the volumetric flow rate of the sidewall-passivation gas is from 1:1 to about 10:1.

60. (Previously presented) A method according to claim 56 comprising at least one of the following characteristics (i) the fluorine-containing etching gas comprises one or more of NF_3, CF_4 or SF_6; or (ii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

61. (Previously presented) A method according to claim 56 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

62. (previously presented) A substrate etching method comprising:

placing a substrate comprising a silicon-containing material in a process chamber, the silicon-containing material comprising at least one of silicon dioxide, silicon nitride, polysilicon, and monocrystalline silicon; and

etching the silicon-containing material by providing in the process chamber, an energized gas formed from a process gas comprising CF_4, Cl_2 and N_2.

63 (Previously presented) A method according to claim 62 wherein the silicon-containing material comprises a plurality of dopant concentrations or dopant types, and wherein the volumetric flow ratio of CF_4, Cl_2 and N_2 is selected to etch the plurality of dopant concentrations or dopant types at etch rates that vary by less than about 5%.

64. (Previously presented) A method according to claim 62 wherein the volumetric flow ratio of CF_4 to Cl_2 is from about 2:1 to about 8:1.

65. (Previously presented) A method according to claim 62 wherein the volumetric flow ratio of the combined volumetric flow rate of CF_4 and Cl_2 to the volumetric flow rate of N_2 is from 1:1 to about 10:1.

66. (Previously presented) A method according to claim 62 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

67. (Previously presented) A substrate etching method comprising:

placing a substrate comprising a silicon-containing material in a process chamber; and

etching the silicon-containing material by providing in the process chamber, an energized gas formed from a process gas consisting essentially of CF_4, Cl_2 and N_2.

68. (Previously presented) A method according to claim 67 wherein the silicon-containing material comprises a plurality of dopant concentrations or dopant types, and wherein the volumetric flow ratio of CF_4, Cl_2 and N_2 is selected to etch the plurality of dopant concentrations or dopant types at etch rates that vary by less than about 5%.

69. (Previously presented) A method according to claim 67 wherein the volumetric flow ratio of CF_4 to Cl_2 is from about 2:1 to about 8:1.

70. (Canceled)

71. (Previously presented) A method according to claim 67 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

72. (Previously presented) A substrate etching method comprising;

placing the substrate in a process chamber;

in a first etching stage, providing in the process chamber, a first energized gas formed from a first process gas comprising CF_4, chlorine-containing gas and sidewall-passivation gas; and

in a second etching stage, providing in the process chamber, a second energized gas formed from a second process gas comprising a bromine-containing gas.

73. (Previously presented) A method according to claim 72 wherein the bromine-containing gas comprises HBr, Br_2 or CH_3Br.

74. (Previously presented) A method according to claim 72 wherein the bromine-containing gas comprises HBr.

75. (Previously presented) A method according to claim 72 comprising at least one of the following characteristics (i) the chlorine-containing gas comprises one or more of Cl_2 or HCl; or (ii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

76. (Previously presented) A substrate etching method comprising:

placing the substrate in a process chamber; and

in a first etching stage, providing in the process chamber, a first energized gas formed by coupling RF or microwave energy to a first process gas comprising fluorine-containing etching gas, chlorine-containing etching gas, and sidewall-passivation gas comprising a gas other than the fluorine-containing etching gas; and

in a second etching stage, providing in the process chamber, a second energized gas formed from a second process gas comprising bromine-containing gas.

77. (Previously presented) A method according to claim 76 wherein the bromine-containing gas comprises HBr, Br_2 or CH_3Br.

78. (Previously presented) A method according to claim 76 wherein the chlorine containing etching gas comprises one or more of Cl_2 and HCl.

79. (Previously presented) A method according to claim 78 wherein the bromine-containing gas comprises HBr.

80. (Previously presented) A method according to claim 76 comprising at least one of the following characteristics (i) the fluorine-containing etching gas comprises one or more of NF_3, CF_4 or SF_6; or (ii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

81. (Previously presented) A substrate etching method comprising:

placing the substrate in a process chamber; and

providing in the process chamber, an energized gas formed from a process gas consisting essentially of CF_4, Cl_2 and N_2, wherein the volumetric flow ratio of the combined volumetric flow rate of CF_4 and Cl_2 to the volumetric flow rate of N_2 is from about 1:1 to about 10:1.

82. (Previously presented) A method according to claim 81 further comprising a second etching stage in which an energized gas formed from a second process gas comprising bromine-containing gas is provided in the chamber.

83. (previously presented) A substrate etching method comprising;

placing a substrate comprising a silicon-containing layer in a process chamber, the silicon-containing layer consisting essentially of metal silicide; and

etching the silicon-containing layer by providing in the process chamber, an energized gas formed from a process gas comprising CF_4, chlorine-containing gas and sidewall-passivation gas.

84. (previously presented) A substrate etching method comprising:

placing a substrate comprising a silicon-containing layer in a process chamber, the silicon-containing layer consisting essentially of metal silicide; and

etching the silicon-containing layer by providing in the process chamber, an energized gas formed by coupling RF or microwave energy to a process gas comprising fluorine-containing etching gas, chlorine containing etching gas comprising one or more of Cl_2 and HCl, and sidewall-passivation gas comprising a gas other than the fluorine-containing etching gas.

85. (previously presented) A substrate etching method comprising:

placing a substrate comprising a silicon-containing layer in a process chamber, the silicon-containing layer consisting essentially of metal silicide; and

etching the silicon-containing layer by providing in the process chamber, an energized gas formed from a process gas comprising CF_4, Cl_2 and N_2